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| 10/660,354 | 09/10/2003 | Stephen F. Yates | H0004293 | 5140 |

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Honeywell International, Inc.
Law Dept. AB2
P.O. Box 2245
Morristown, NJ 07962-9806

| EXAMINER | |
|---|---|
| CONLEY, SEAN EVERETT | |
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| 1797 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/660,354 | YATES ET AL. | |
| | Examiner | Art Unit | |
| | SEAN E. CONLEY | 1797 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *7/1/2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,9-13,17-19 and 65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 9-13, 17-19, and 65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. The amendment filed July 1, 2008 has been received and considered for examination. Claims 1, 9-13, 17-19, and 65 remain pending.

### *Claim Rejections - 35 USC § 103*

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 10-13, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. in view of Nishikawa (JP 2000237538 A – English language machine translation).

Regarding claim 1, Say et al. disclose an air treatment unit for removing a pollutant from an air stream which is further capable of providing cleansed air to an interior air space. The system of Say et al. comprises at least one air cleaner unit (reactor (100)) in communication with said interior air space, wherein said at least one air cleaner unit provides only a single flow path for said air stream using blower (118). Blower (118) is used to facilitate unidirectional air flow in the direction of the arrows in figure 5. The at least one air cleaner unit comprises at least one photocatalytic oxidation unit (formed by photocatalytic fins (102)) and a first discrete adsorbent unit (adsorbent buffer (not shown) positioned upstream from the photocatalytic oxidation unit - see col. 7, lines 32- 55). Therefore, the at least one photocatalytic oxidation unit is

located downstream from said first adsorbent unit (see figure 5; see col. 3, lines 38-65; see col. 7, lines 12-55). The first adsorbent unit includes a first adsorbent material selected from zeolites such as molecular sieve 13X, active carbon, and other surface area materials such as HEPA filters, wool, or high surface area titanium dioxide and functions as an adsorbent buffer (see col. 7, lines 32- 55). The adsorbent material inherently has a first isotherm curve for a pollutant.

Say et al. also disclose that the air cleaner unit comprises a second discrete adsorbent unit (post-filter (122)) spaced from and located downstream from said first photocatalytic oxidation unit. The second adsorbent unit may comprise a scrubber, adsorbent bed, or reactant bed (see figure 5; see col. 7, lines 25-31). The first adsorbent unit is adapted to reversibly adsorb said pollutant from said air stream at a first concentration of said pollutant and said first adsorbent unit is further adapted to desorb said pollutant into said air stream at a second concentration of said pollutant (see col. 7, lines 25-55).

However, Say et al. fails to explicitly disclose the material used for the second adsorbent material of the second adsorbent unit (post-filter (122)). Therefore, it would have been necessary and thus obvious to look to the prior art for conventional materials used for a post filter adsorbent in an air cleaning unit.

Nishikawa et al. provides this conventional teaching showing that it is known in the art to use a zeolite, porous silica, and activated carbon as the adsorbent located downstream from a photocatalyst unit in an air cleaning device. The adsorbent functioning to adsorb the remaining contaminants in the air stream that were not

removed by photocatalytic oxidation (see figures 1-2; see English abstract; see paragraphs [0024]-[0028] of the English language machine translation).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the post filter from activated carbon motivated by the expectation of successfully practicing the invention of Say et al. In addition, the use of a zeolite or activated as the downstream second adsorbent material, as exemplified by Nishikawa, will result in a second adsorbent unit with a steeper isotherm curve than the first isotherm curve of the first adsorbent unit when activated carbon is used as the adsorbent in the first adsorbent unit of Say et al. since the second adsorbent unit would function to remove all pollutants from the air stream whereas the first adsorbent unit is a buffer that only reversibly adsorbs and desorbs the pollutant. Thus, the second absorbent unit is adapted to adsorb the pollutant from the air stream at a second concentration because it has a steeper isotherm curve.

Furthermore, it would have been obvious to one of ordinary skill in the art to use a material with a steeper isotherm curve (higher adsorption ability) for the second adsorbent unit (post-filter 122) in the invention of Say et al. in order to ensure that all remaining contaminants are adsorbed from the contaminated air prior to the air exiting from the device as exemplified by Nishikawa.

Say et al. also disclose that the first photocatalytic unit (formed by photocatalytic fins (102) with lamps (104)) is physically separated from and located downstream from the first adsorbent unit (not shown but disclosed as being positioned upstream before fins (102) - see col. 7, lines 32-55).

Regarding claims 10-12, Say et al. fails to specifically disclose the size of the micropores of the adsorbent material or an absorbent material that is activated carbon fabric. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Say et al. and use any suitable material having a specific isotherm curve, specific pore size, or a specific material type for the first and second adsorbent unit since the Applicant has admitted that selecting the appropriate adsorbent material for an adsorbent unit is a matter of design choice based on operating conditions such as type of contaminant and concentration (see specification page 21, lines 12-30). Furthermore, absent a showing of unexpected results, it would have been obvious to modify the pore size of the adsorbent material through routine experimentation in order to determine the pore size suitable for a specific contaminant or concentration of contaminant.

Regarding claim 13, the air cleaner unit (reactor (100)) is capable of being used in combination with the interior air space within an aircraft.

Regarding claim 17, Say et al. disclose a particulate filter (pre-filter (120)) located upstream from the at least one photocatalytic oxidation unit (formed by fins (102) and lamp (104)) and the adsorbent filter (122) (see figure 5; see col. 7, lines 12-25).

Regarding claims 18 and 19, the air cleaner unit of Say et al. is capable of operating at a constant temperature and at ambient temperature. Say et al. does not disclose any requirements on a specific operating temperature.

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. in view of Nishikawa as applied to claim 1 above, and further in view of Ogata et al. (U.S. Patent No. 6,531,100 B1).

Say et al. disclose that the photocatalytic oxidation unit comprises at least one photocatalytic panel (fin (102)), wherein the fin (102) comprises a metal photocatalytic support (see col. 3, lines 50-65). However, Say et al. is silent with regards to specific types of metal used for the photocatalytic support, therefore, it would have been necessary and thus obvious to look to the prior art for conventional metal materials.

Ogata et al. provides this conventional teaching showing that it is known in the art to use an aluminum substrate as the support material for a photocatalyst (see col. 2, lines 52- 65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the metal photocatalytic support from aluminum material motivated by the expectation of successfully practicing the invention of Say et al.

5. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. in view of Nishikawa as applied to claim 1 above.

Say et al. discloses the claimed invention in the embodiment as shown in figure 5 and disclosed in col. 3, lines 38-65 and col. 7, lines 12-55. However, this embodiment of Say et al. fails to disclose the configuration of lamps and photocatalytic panels as recited in claim 65. However, an alternative embodiment of Say et al., shown in figure 9, discloses a photocatalytic oxidation unit (formed by fins (502) and lamps (504) in reactor

(500)) comprising a plurality of photocatalytic panels (fins (502)) and a plurality of ultraviolet sources (lamps (504)), wherein the panels and ultraviolet sources are arranged linearly and parallel to each other in an alternating setup (see figure 9). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the photocatalytic oxidation unit of figure 5 with the photocatalytic oxidation unit of figure 9 based on the suitability and desired characteristics of the arrangement. Furthermore, substitution of known functionally equivalent structures involves only ordinary skill in the art and the courts have held that when a patent teaches a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result. KSR v. Teleflex

***Response to Arguments***

6. Applicant's arguments with respect to claims 1, 9-13, 17-19, and 65 under 35 U.S.C. 103(a) based on Say et al. and Shiga et al. have been considered but are moot in view of the new ground(s) of rejection.

With respect to Say et al., the Applicant argues that Say et al. does not disclose that the two adsorbent units are adapted to adsorb the same pollutant. This argument is not persuasive since it is directed to an intended use of the apparatus and furthermore, the newly cited reference to Nishikawa has been relied upon to teach that it is well known to use an adsorbent such as activated carbon located downstream from the photocatalytic unit in order to remove any remaining pollutant that was not removed

by photocatalytic oxidation. Furthermore, the Applicant argues that the Examiner has admitted that Say et al. fails to disclose that the two adsorbents are adapted to adsorb the same pollutant. The Examiner disagrees. It was only admitted that Say et al. fails to provide the material for the adsorbent in the downstream adsorbent bed (see page 3, paragraph 3). The resulting combination of Say et al. and Nishikawa result in a first and second adsorbent materials which have different isotherm curves (the second adsorbent bed being steeper in order to permanently remove remaining pollutants) and are capable of adsorbing the same pollutant.

7. Applicant's arguments with respect to the prior art reference of Ogata et al as applied to claim 9 have been fully considered but they are not persuasive. Applicant argues that claim 9, because of its dependency on claim 1, defines a novel and unobvious air quality system. This argument is not persuasive because claim 1 is rejected as being unpatentable over Say et al. in view of Nishikawa. Therefore, claim 9 remains rejected as stated above.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean E. Conley whose telephone number is 571-272-8414. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 15, 2008

/Sean E Conley/
Primary Examiner, Art Unit 1797